HOW TO BUILD

SCHOOL HOUSES;

WITH SYSTEMS OF

HEATING, LIGHTING,

AND

VENTILATION.

BY

G. P. RANDALL, ARCHITECT,

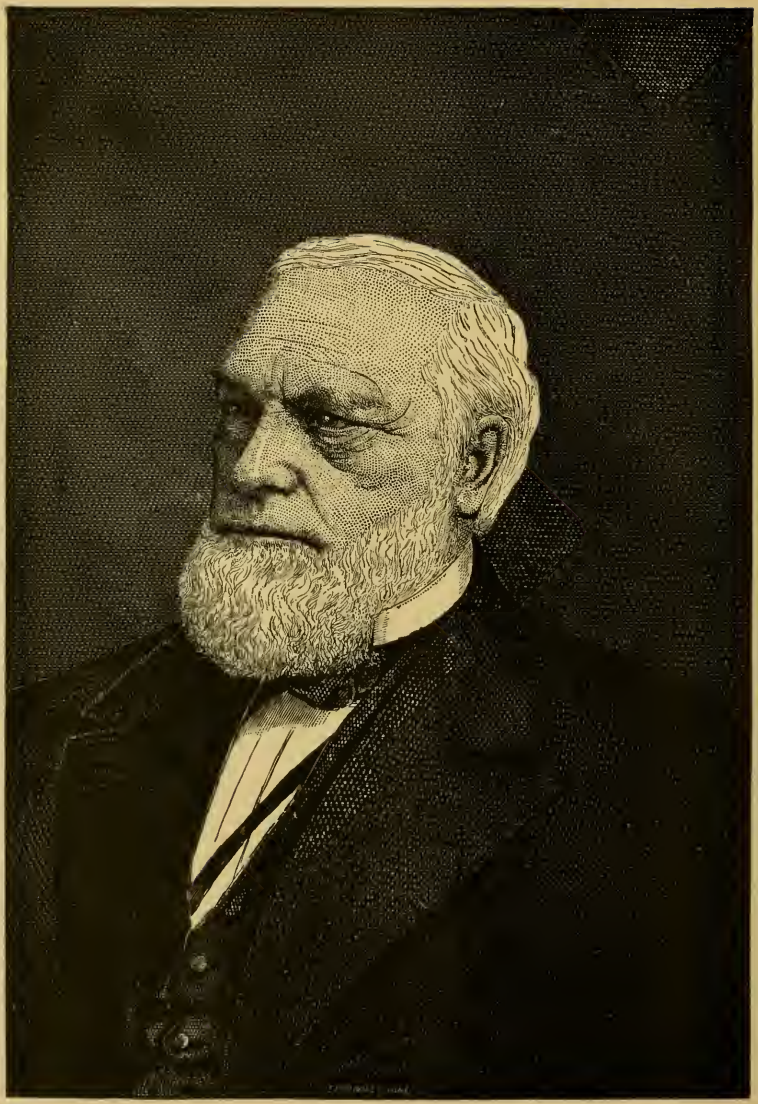
CHICAGO, ILL.

CHICAGO:
GEO. K. HAZLITT & CO., PRINTERS AND PUBLISHERS,
1882.

Below I give the reader a list of some of the prominent buildings for educational purposes designed by me, but this list only comprises a small part of what we call public school buildings that I have designed:

Northwestern University, Evanston, Ill.
Evanston College for Ladies, Evanston, Ill.
Ladies College of Madison University, Madison, Wis.
Mercer University, Macon, Ga.
Academy of the Sacred Heart, St. Louis, Mo.
St. Mary's Academy, Leavenworth, Kan.
Jefferson Liberal Institute, Jefferson, Wis.
State Normal University, Normal, Ill.
State Normal School, Winona, Minn.
State Normal School, Whitewater, Wis.
State Normal School, Plattville, Wis.
High School, Marshall, Mich.
High School, Clinton, Ill.
High School, Atchinson, Kan.
High School, Denver, Col.
High School, Madison, Wis.
High School, Kankakee, Ill.
High School, Winona, Minn.
High School, Berlin, Wis.
High School, Litchfield, Ill.
High School, Olney, Ill.
High School, Galesburg, Ill.
High School, Red Wing, Minn.
High School, Aurora, Ill.
High School, Laporte, Ind.
High School, Plymouth, Ind.
High School, Menomenee, Mich.
High School, Marinette, Wis.
High School, Dodgeville, Wis.
High School, Omaha, Neb.
High School, St. Paul, Minn.

And several hundred Ward School buildings scattered over the country, South to the Gulf States, East as far as Pennsylvania and Vermont, West to Colorado, North to Minnesota, and within a radius of five hundred miles of this city a "fearful heap" of them.



Yours truly

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The want of proper superintendence often results in notorious imposition on the part of the builder, and great injury to the building, and generally ends in law-suits. In the thirty years I have been in this business, there has never but once—a single instance—been a law-suit growing out of differences that I could not amicably settle between the contractor and my client; but I can recall scores of instances where disastrous suits have come to my clients for no other reason than because they intrusted the management of the work to mechanics, themselves, or other inexperienced persons. It don't pay.

My commission will be on the *entire cost of the building*, including *heating apparatus*, *extras*, *if any*, *etc.*, and will be made known on application.

The plans will include all necessary scale and detail drawings, and if an important building, sometimes two or more copies have to be provided, and with these full and complete specifications of all the work. The specifications will generally be printed.

I invite any and all persons into whose hands this may fall, to give me early notice of buildings of every kind, to be erected, in their vicinity, and the address of persons interested; and if it results in benefit to myself, the party first giving me such information will be suitably rewarded.

REFERENCES.

My acquaintance throughout the northwest, within a radius of five or six hundred miles of this city, with the business men, and especially the mechanics and builders of the country, is extensive, and for the reason that buildings of my designing may be found in almost every town and hamlet; but if not sufficiently known where such services may be wanted, I may safely refer to the business men generally of Chicago, where I have lived now over twenty-five years, or those outside of Chicago, with whom I have made business acquaintances during that period of time; and who of all these, at home or abroad, can point to a single act of my life

that will not square with the strictest principles of integrity? or in building construction, with the soundest principles of the constructive art? I have built a great many

COURT HOUSES, COLLEGES,

universities, churches, railway and other heavy and important structures, and have never had to endure the mortification of seeing them fall down, settle, or crack, for want of proper construction; and while it may sound a little egotistic for me to say this, I challenge any man in the profession to show a cleaner record.

BIOGRAPHICAL.

I am now nearly sixty-one years old. I was born and raised a mechanic—my father having been a practical builder and millwright before me, which business I followed till twenty-five years old. After this I was engaged five years in the construction of several of the important railways in my native (Green Mountain) state and elsewhere; and since thirty, have made the business of an architect my chief livelihood, with scientific studies interspersed as a kind of recreation, for I have in fact seldom had any other during all these long years. Some half a dozen years since I became so much engrossed in my scientific studies that I partially retired from active business as an architect, having turned the chief management of my business over to a partner; but I soon found that a business, and that, to, one of the largest ever attained by any practitioner in this country, would soon go to naught when that individuality which had built it up, was eliminated from it. I therefore, some two or three years since, again buckled on my armor as of yore, and am now fast gaining my prestige of some twelve or fifteen years ago, when I employed twelve to fifteen of the best draughtsmen and assistants that I could find east or west.

N. B.—It is my purpose at no distant day to issue a pamphlet similar to this one, on the subject of Church Designing, another on Jail Construction, of which I have de-

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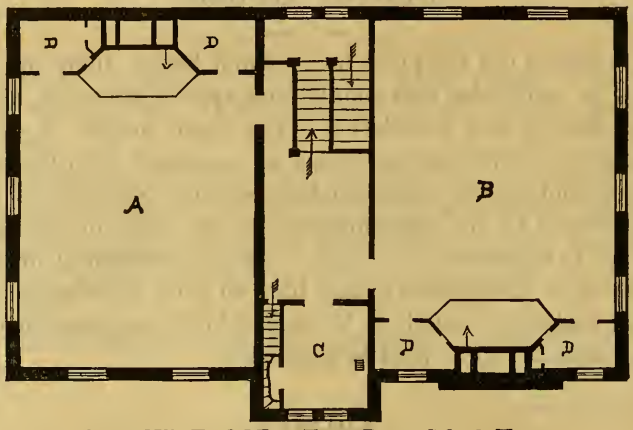
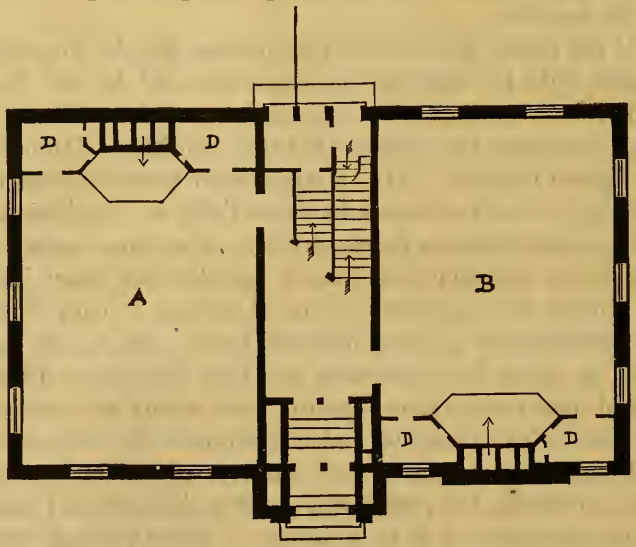
ticable, because in facing the teacher the pupils would face a glaring light.

In making these designs I have aimed at the most rigid



SECOND FLOOR.—*Four Room School House.*
REFERENCE.—A, B, School Rooms. D, D, Wardrobes.

economy in everything consistent with a good building. The rooms are a paralleogram, generally about 25 feet wide, which



FIRST FLOOR.
A Four Room School House at Prophetstown, Ill. (now building.)

require 26 feet joist for the second floors, and to get longer joist is to increase the expense very considerably, owing to the greater expense of procuring such heavy timbers.

PROPHETSTOWN SCHOOL HOUSE.

Then I make the room from 33 to 36 or 38 feet long, according to circumstances and the number of pupils to be seated in each.

A room 25 feet wide will give space for six rows of single desks, and 33 to 35 long will provide for ten tiers of seats the other way.

N. B. Persons ordering plans should always give the num-

ber of sittings in each room, and leave the architect to determine its size. Suggestions as to size, however, are always in order.

I would never, except in a crowded city, advise that a house be built more than two stories high above the basement or cellar, which should have good concrete floors, so that they may be kept clean and tidy, and besides being fuel and furnace rooms, they can be used by the children for exercise in foul weather, or in some cases may be fitted up for lunch rooms.

In designing such a building, with four school rooms on a floor, and with special reference to the best arrangement for light, the outline of the building necessarily becomes what we call irregular. With architects this is not generally considered a fault, but with persons of uncultivated tastes in architecture, it is not an uncommon occurrence that they object to this, and want a regular parallelogram in plan, with a front door in the center, and the building equally balanced on each side. This may sometimes be in good taste, but it depends on the style of finish and details of the work. They can generally be made either way in the front, if the interior arrangements are not arbitrary, but they generally will be if the subject of light has the attention it deserves.

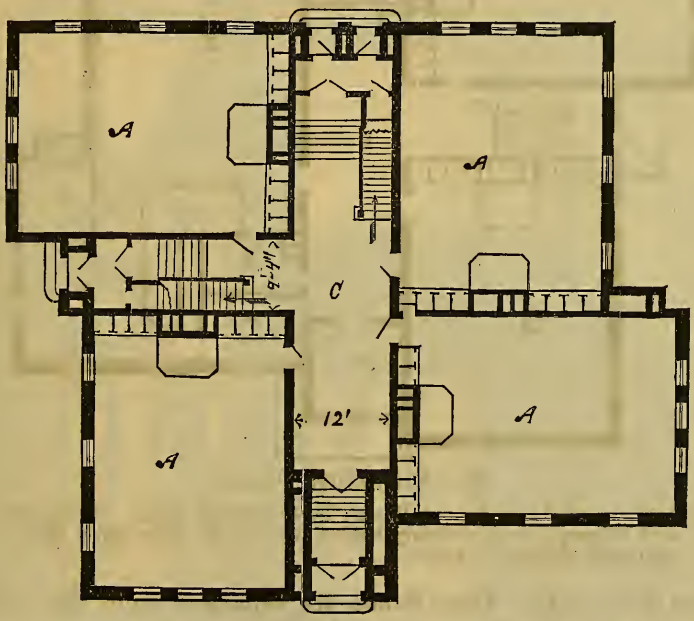
School directors should always make suggestions freely as to what they think they want, and if I cannot make such combinations as they suggest, I will do the best I can towards it.

In making new designs for such buildings, the drawings will be penciled and then traced on thin paper and submitted to the inspection and approval of the Board, and in no case do I make up such drawings until the design has the approval of the Board or individual for whom I make it.

WARDROBES.

In the arrangement of school houses there are several ways of constructing these important adjuncts. When I commenced to design school buildings for this city (Chicago) 25 years ago, I found that in those previously built the wardrobes were rooms very nearly square, and the sexes occupied them together. I made these in the new buildings long and narrow, this form

giving the greatest amount of wall surface on which to hang clothing. About 15 or 16 years ago, in building the State Normal school at Winona, Minn., and afterwards the City High school there, in place of these long narrow rooms, I made a succession of boxes or wardrobes, each about 2x2 feet square, with doors in front and hooks on the other three sides. A half dozen scholars more or less could use each of these. They were usually built at the end of the school room opposite the teacher's dais, but more lately I have located them on each side of the teacher's dais or platform. These small wardrobes have the advantage of occupying about one half less floor space than those in the form

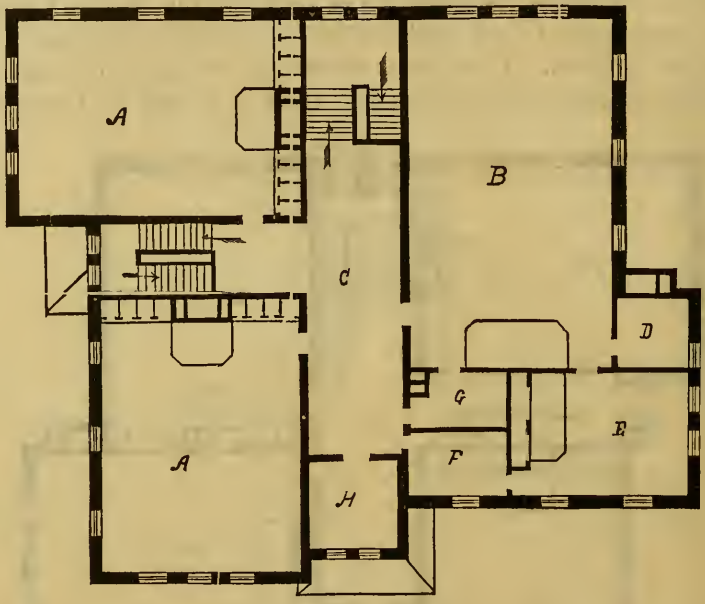


FIRST FLOOR PLAN.—*High School Building, Dodgeville, Wis.*
REFERENCE.—A, A, School Rooms; C, Stairway Hall.

of a parallelogram, and hence the building would be somewhat reduced in size and cost. The cut representing the floors of the Dodgeville, Wis., school house, has this arrangement of wardrobes, the boys using those on one side and the girls on the other. This arrangement has the advantage of keeping the pu-

pils, as they come and go, always under the eye of the teachers, and without leaving their dais.

But I have more recently made what I consider an improvement on this small wardrobe arrangement. Placing the flue stack, as at Dodgeville, back of the teacher's platform, I locate the boys' and girls' wardrobes on each side, as shown in the plans for a house lately designed for Maywood, one of the suburban



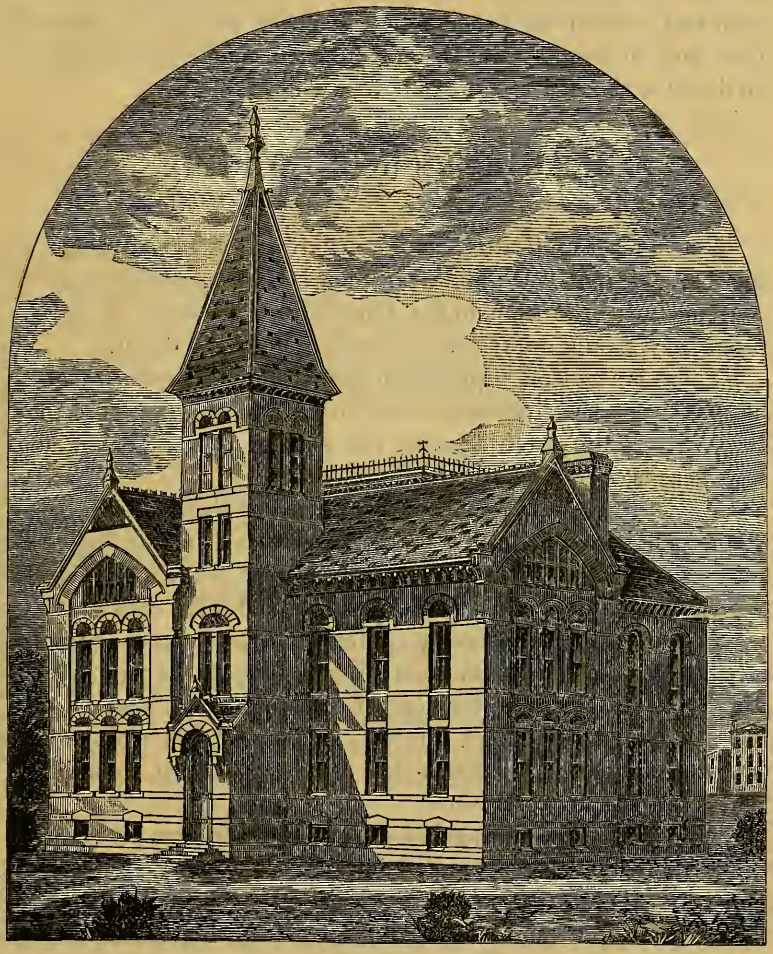
SECOND FLOOR PLAN.

REFERENCES.—B, large School Room; E, Recitation Room; D, Apparatus and Library; A, A, ordinary School Rooms; H, Principal's office; F, G, Cloak Rooms; C, Hall.

towns of this city. These rooms are separated from the main room by a thin plank partition about seven or seven and one-half feet high, with door, and open above, so that the rooms are finely lighted from the windows that light the main room.

In the splayed surfaces or sides of these rooms, next the teacher's dais, there is a small window, through which the teacher from her position, standing at her desk, can observe all the movements of the scholars while inside the rooms. One of

these rooms is for each of the sexes. This arrangement is undoubtedly the best and most economical, while it affords what I think will be the most satisfactory solution of the problem, how best to arrange the wardrobes in a school-house.



HIGH SCHOOL BUILDING, DODGEVILLE, WIS.

Blackboards.

I arrange blackboards on all sides of the room. That on the side back of the teacher is the width of the flue stack, or about seven feet, and on the other three sides they occupy all the wall space, and in height from the crayon shelf under, to the top of the door, or about five and a half feet wide.

Ventilating School Buildings.

The subject of heating and ventilating school buildings is one of great importance; and while most school boards are ready to admit its necessity, they do not know how to go about it, nor to whom they should apply for information on this subject.

There is a general supposition that if they are going to build they must of necessity have an architect, and they suppose that all architects are familiar with the subject of ventilation, and right here is their first and fatal mistake.

But the first thing that a school director should learn, is to distinguish between those who are real *experts* in this business, and those who are simply pretenders; between those whose ideas, are based on sound scientific principles, and mere copyists.

The unskillful ventilating engineer is likely to make a smoke flue too large or too small, or so unshapely as to defy all principles of pneumatics and their practical application, and is surprised when he finds that his flue smokes at the wrong end, and naturally concludes that he has it wrong end up, though he cannot tell why it works thus.

A man who can arrange all the parts of a system of ventilation so there shall be no want of harmony between the science or theory and its practical application, has attained to a high place in his profession, and the school director who, after having listened to the unscientific declaimer, can determine whether the man is, in reality, an *expert* in the business, instead of an ignorant pretender, has at least one fitting qualification for the position to which a confiding constituency have called him.

Several Systems of Ventilation.

There are several systems of ventilation applicable to school houses, one of which is known as the upward system, or upward exhaust in contradistinction to the downward exhaust, or as it is more commonly called, the

RUTTAN SYSTEM.

In the construction of school buildings, I have generally adhered to the *Ruttan* system for ventilation.

This Ruttan system, so called, was introduced into this part of the country some twenty years ago, by the patentee, the Hon. Henry Ruttan, of Coburg, Canada West; but has since undergone great modifications and improvements, by and through the agency of the successors to his business, and the writer; and I will stake my reputation as a ventilating engineer and architect, that in respect to ventilation the designs I am now making have no peers in this country.

This Ruttan principle is to take the air out of the room at the floor; and sometimes, and as was generally his practice, down to the cellar or basement, thence to an exhaust shaft; and on this account it is sometimes spoken of or referred to as the

DOWNWARD EXHAUST

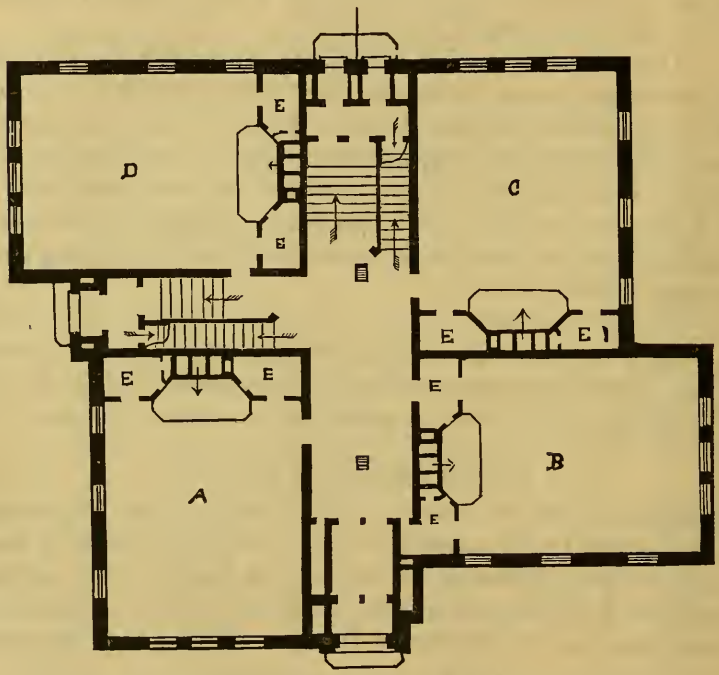
principle. There is, however, another method which is perhaps more in accord with science, of which the writer claims to have made the first application, in this city, at least, in the building known as the Union Park Congregational church; and this, in contradistinction to the first or Ruttan method, I have called the

UPWARD EXHAUST

system. But I will say here, that in the application of the two systems to school houses, my preference is for the downward exhaust, or Ruttan system, and chiefly on account of certain advantages in the application of the two. I shall therefore reserve further explanation of the upward system until I publish a pamphlet on the construction, heating, and ventilation of churches, which I hope to do at no distant day.

Now if the reader will agree with me, as most intelligent people do, that the Ruttan system is *par excellence* the correct system for heating and ventilating a school room, I will explain somewhat more in detail the general principles on which it is based.

I have already said that the air is to be exhausted out of the room at the floor. In the upward exhaust system as applied by myself in the U. P. Church, the air is taken out at the ceiling.

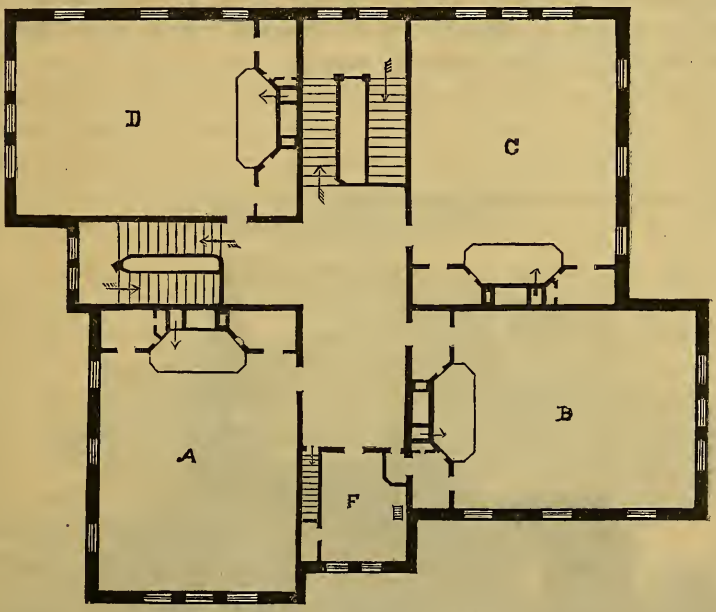


FIRST FLOOR PLAN.—*Maywood, School House, (not yet built.)*
REFERENCE.—A, B, C, D, School Rooms; E, E, E, Cloak Rooms.

Ruttan took it out through the base of the room, and this method has not yet been improved upon. I am aware that some architects for whose opinions I have great respect, set registers in the floor and at different points in the room, I presume for the purpose of producing a change of air in these sections, but this I deem a serious error, for the reason, that around such registers in the

floor there must of necessity be a movement of air towards the register, and no child can sit with his or her feet within the influence of these currents without having cold feet. It does not matter what may be the temperature of the air in the room, moving currents will always absorb and carry off the heat from the body and produce cold, which is the absence of heat. In my own practice I have always preferred Mr. Ruttan's views as to the best method of getting the air out of the room.

There is another and all important reason for its passage through the base, and it is this: There are generally in every



SECOND FLOOR PLAN.

REFERENCE.—A, B, C, D, School Rooms; F, Principal's office.

school room two or more outside walls, or walls that are exposed to the outside cold, and these walls will be penetrated with frost, and though they may, as they always should, be furred inside and the laths nailed to the furrings, yet the effect of walls so situated is to make a much colder surface inside the room than will be found on the surface of inside walls.

Again, the windows for lighting these rooms must necessarily be located in these outside walls, and this, too, will exert a powerful influence in absorbing the heat that comes in contact with the glass, if, as is generally the case, the windows are built single, in which case the air cooled by contact with the glass, and that cooled by contact with the comparatively cold wall surface, will be condensed, and its specific gravity being increased thereby, it will immediately fall to the floor. Now, if the outlet for impure and cold air be through a perforated base, it will at once pass out of the room, but if it pass out through exit registers scattered around the floor, as soon as it strikes the floor it will at once glide along its surface, making a zone of cold air on the floor till it finds these registers.

HIGH SCHOOL BUILDING, MAYWOOD, ILL.

It should require no further argument to enable the reader to decide which of the two methods is the preferable one. In my practice in years past, I have generally perforated the base the entire length of the two sides of the room adjacent to the outside walls, but under some circumstances it may do to place this perforated or exit base only under the windows. It was an idea with Mr. Ruttan that the air in such a room, or indeed in any well ventilated room, should move in and out of the room in such imperceptible currents as not to be felt by the occupants of the room. Nothing could be more correct in principle or practice. The reverse of this will produce colds as surely as the victim gets within their influence. How common an occurence it is for people sitting near a window to begin to sneeze, and frequently they imagine that the cold currents they feel are wind currents, entering around the sash, and begin to calculate the utility of having window strips, etc., when in fact it is the condensation or cooling of the air in the room by contact with the cold glass by which a downward current is produced as already stated.

It matters but little whereabouts in the room the warm fresh air is introduced, whether at the floor, through the ceiling, or through the wall between floor and ceiling, and whether at one or a dozen places, as regards the heating and ventilating of the room, but there may be other reasons, and important ones, that should govern the architect in his choice of position for the inlet registers. On account of security against fire, I generally set the register in the wall above the blackboards, or eight or nine feet above the floor.

Now, we will suppose we have a large volume of moderately heated air coming into the room from the furnace. As soon as it is in the room it goes at once to the ceiling, and spreads out over the entire surface in a level zone, and as this process goes on there must at once commence an exit of cold or foul air (the coldest in the room) at and through the perforated base, and very soon, or in the space of five to ten minutes, this zone of warm air will reach entirely to the floor, and will have driven the cold air out of the room, for it should not be supposed that we can get the warm fresh air into the room unless we provide a

proper exit for the cold and foul air already in it. And here let me say that one and not the least of the advantages of exhausting the air at the bottom of the room is that as we fill the room with warm pure air from the top down, the walls and ceiling, if cold at the start, are soon after in contact with warm air, and in a few minutes such walls will become sensibly warm, and this at once stops all down cold currents that would otherwise exist near the wall surface.

This is the chief advantage that the downward has over the upward exhaust systems. In some buildings the two systems work admirably together in the same room, though to some this assertion may seem a little paradoxical.

Observe, now, the advantage of having our perforated base chiefly on the cold side or sides of the room. As this is the side of exit for the cold air, the exhaust naturally draws the same zone of air above, to these sides of the room, so that what would otherwise be the coldest and most uncomfortable place in these rooms—the tier of seats next the outside walls—are in fact the warmest and best ventilated parts of the room.

Having provided a way for the foul air to escape out of the room let us follow it a little farther. Mr. Ruttan's method was to gather the foul air to some convenient point under the floor and take it down to the cellar or basement and then gather it, through the agency of horizontal ducts in or under the cellar, to a large ventilating shaft, and through this it was exhausted to the open air above the roof. To this exhausting air-shaft the writer added a smoke pipe in the center to which, and through which the smoke was gathered and passed from the furnaces to the open air.

This pipe radiating heat in the ventilating shaft, was so great an addition to the motive power of ventilation, that it at once came into general use, and I apprehend there are but few people who do not suppose or think that this radiating pipe is a part of the Ruttan system. The credit of the *invention* belongs as I think to a Connecticut architect, Mr. Stone, of New Haven, if I have been correctly informed. The writer found it in a Philadelphia hospital some twenty-five years ago, and realizing its great value, introduced it to and with the Ruttan system, as he thinks, with excellent results.

But in the course of time and after long study I have found what in my judgment is a better arrangement, one less liable to get out of repair or to be affected by wind currents, and withal a simpler and better method.

By reference to one of the floor plans in the accompanying engravings it will be seen that there are several flues directly behind the teacher's dais or platform. I make a gathering or foul air chamber under this platform and between it and the top of the furnace, into which all the foul air that passes out of the room through the perforated base, finds its way by passing between the joists and furrings on top of them, and from this foul air chamber the air passes into one of the flues in this adjacent stack up to the open air and out of the building. I set the furnace against this stack of flues and under the platform, and pass the heat directly from the furnace into the flues without intervening metallic pipes. This flue is cut off at the top of the large register behind the teacher's dais, and through this register the air passes from the flue into the room.

In this way there can be no possible danger as there is no wood-work in contact with or even near the register, and consequently no danger from fire originating around these furnaces need be apprehended. It will be seen to, that each set of two rooms has a furnace and a full complement of warm air, ventilating and smoke flues independent of all others and this will preclude any of the difficulties of back currents, which are so common a source of trouble. In heating and ventilating a school-house of two stories in height, I always prefer to use one furnace for each pair of rooms, the rooms being one above the other. With such an arrangement in regard to the construction of the furnace flues as will form a part of every specification I make, they will be so built that the teachers will be able to control the heat and ventilation perfectly, and what is of the greatest importance, *they cannot get them wrong.*

In this improved way of doing it the builders will understand how to construct every part, and not, as heretofore, often, very often, spoil the whole arrangement of the ventilation through carelessness and ignorance.

But I must again caution school directors against falling into the too common error of supposing that with the description given here, ANYBODY can design such work, because anybody cannot do it. There is but rarely an architect who can do it, and none except they have made it a special study. Of the hundred architects in this city, many of whom stand high, very high, in their profession, I only know of one or two, beside myself, who have a sufficient knowledge of the practical application of it, to make a success of such a simple building as a school-house, much less one with more complicated parts. On the other hand there are those not only in this city but in some of the prominent cities within a radius of five hundred miles of here, who are making a specialty of doing such work, and are doing an immense deal of it, who know nothing at all about the Ruttan or any other system of ventilation, beyond that of putting a flue or two in the wall, with exit registers, but without knowing whether the air will go in or out of them.

They are practicing an egregious imposition upon those who are giving them their confidence. Until school directors can distinguish between those who do and those who do not understand these things, their children must continue to breathe an atmosphere that will bring to them sickness, disease and death.

But there is one class of persons who are vitally interested in having the school buildings ventilated, and who, owing in part to their superior education, and in part to the fact of their having to pass so much of their time in school rooms, may be relied upon for co-operation in the good work of educating school directors to the necessity of having well ventiated school buildings, I allude to the

PRINCIPALS OF THE SCHOOLS

and their assistants.

I think I have foreshadowed enough of the details to enable any well-informed person to understand the *principles* of ventilation if they will but look into it. I have purposely omitted to explain the all-important parts that must have special attention in the construction, as being more properly a part of the specification and details. These, if I make them, will have the most careful attention.

Heating.

There is one part of this subject to which I desire to call the special attention of School Boards, School Superintendents, Principals and all, and that is that when a house is ever so well provided with a system of ventilation, it will never ventilate until it has a proper heating apparatus. Without this it is like a locomotive without a fire, it has no motive or moving power, and however correct in principle and in all its details it may be, it is of little worth until it has the fire and water put to it.

The same apparatus that will ventilate one of my school houses with furnace heat, will also do it with heat generated through the agency of steam pipes. Instead of setting a furnace inside the warm air chamber, place a sufficient coil of steam pipes there, and this is all there is of it. But generally the steam heating is much the more expensive method of the two, and requires the most careful attention on the part of the janitor. If this individual should neglect to shut off the cold air, or turn the water out of his drip pipes, he will be sure to find his apparatus frozen and burst if the temperature is below the freezing point.

On the other hand, using a furnace, he may leave the fire to burn down and go out, and if it stands 24 hours or six months it is ready to fire up whenever needed.

I have allotted considerable space to the description and advantages of furnace heating, and this chiefly because nine-tenths of such buildings should be thus heated, but there are some of the more complicated kind that cannot be so heated and for the same reason that a business block cannot be heated by hot air from furnaces. In any school building in this northern climate there is an advantage in using steam in setting small coils under each window whereby to counteract the down currents of cold air, made cold by contact with the cold glass, as elsewhere referred to. By placing these coils under each window we provide direct radiation that may be used to keep up the heat in a severe cold day, but not to lessen the source of heat from which and by which the room is ventilated. Inside or double windows will do this nearly as well.

The Kind of Furnace to be Used.

But, the point must not be overlooked that a school house cannot be ventilated only at the expense of heat. It is an easy matter to put up a furnace with small capacity, small pipe connection, etc., and get enough heat through it to *warm* the school room, but when the room is to be ventilated and the air changed every few minutes, it becomes a different thing altogether. Sufficient caloric may be sent into a room to *heat* it, through a small pipe or duct, but if it is essential to ventilate the room at the same time and keep it in a condition fit for respiration with 50 or 60 children in the room, it will, in such case, be essential that the volume of air be increased to three or four times what it was when heating only was required.

It is a common occurrence to find houses amply provided for ventilation with everything but heating power, and this was deficient only because the directors did not understand this important principle. They will fall into the hands of some unscrupulous, or to be charitable I suppose I should say ignorant furnace vender, who was willing to undertake to *heat* the building for a price to be agreed upon, but knowing that the men he was dealing with were *too little acquainted with such work* to know whether the rooms were ventilated or not, he always presumes that if he gets *heat* enough that his work will be accepted, and he gets his pay before it will be found out that there is no ventilation.

Now, the way to avoid all this difficulty is to employ an architect who is thoroughly familiar with the subject of ventilation in all its parts, in every shape in which it can come up, and he should be able to give such advice as will enable you to steer clear of all these difficulties.

In giving the Ruttan furnace the preferance over all others I do so at the risk of incurring the displeasure of other dealers, but when I come to the class of buildings to which their furnaces are specially adapted, I shall not and do not hesitate to do them ample justice. But if I attempt to ventilate a school house with any other than this Ruttan furnace, it is generally a failure.

Then why should I do an act that would soon bring a most valuable class of my clients to presume that as regards the ventilation of school houses, I have more wind than substance. As it is, what reputation I have made for myself as a ventilating architect, I have made, as everybody knows who knows me at all, by recommending no man's wares of whatever kind or quality, for any other consideration than the interest of my clients, and without fear or favor of anybody. Their interests are always identical with my own.

I do not presume that the highest state of perfection has been reached in this Ruttan furnace, and I shall be ready to investigate whenever a better one is presented. If my clients prefer to heat with steam, I shall be ready to second their efforts in adapting it to the necessities of the case in each particular instance, as it shall come up, but I must be allowed to warn school boards that neither friendship nor favoritism should be allowed to influence their action in the determination of such important matters. On the other hand, if they would build a good school house that, in the matter of heating aud ventilation, and superiority of arrangements otherwise, shall be a success without a possibility of failure, they ought to give their orders to the writer to assure this.

The interior finishing, if left to my own judgment, I make neat and plain, but provide everything essential to a good school building. Externally I can make them plain or ornate, as directed, and it should be understood that the designs herewith shown are selected from several hundred, and all differing from each other, and that there is no end to to the variety that can be made for such buildings.

How Best Obtained.

The best method for getting plans is to write as to the number of school-rooms wanted, and about how many scholars is to be seated in a room, and indicate the material of which the building is to be built. Give the position of the lot, whether it be high or low, as regards its surroundings. Whether it has one or more streets or fronts, the points of compass and size of lot. Give the practicability and direction of drainage, and the nature of soil.

This data will enable me to determine whether I have any plans on hand that are similar to what is wanted, which I may possibly send for inspection of the board, if I am satisfied they will not be improperly used, or to my disadvantage.

But it is the most valuable outlay, and one that will yield the best dividends, for the board to pay my traveling expenses, and I will give my time, and go and confer with them and settle all preliminaries before beginning the work. It is emphatically false economy to begin otherwise, still if the board do not so view it, send me the data already indicated and I will make the designs without such conference.

Cost of Such Buildings.

At the present time, (Dec. 1881,) the cost of building a good substantial brick school-house is about $2,500 per school-room. This may vary a little as the price of material may vary in different places, but it is a safe estimate, and a board may safely set down as a fraud the architect who claims that he can make designs from which such a house can be built for much less money.

The design herewith shown for a house at Maywood is the cheapest design that can be made for an 8-room house, and on this occasion will probably be built for a little less than $2,500 per room—perhaps $2,300 or $2,400. All these prices named cover the cost of heating which will be about $250 to $300 per room. They cover the cost not only of heating and ventilation, but also of bell, lightning-rods, and all such necessary accessories to such a building. Don't forget that when I talk or write about the cost of such buildings these things are always included.

Illustrations.

The particular buildings which form the illustrations for this pamphlet, were selected for the purpose of presenting some of the advanced ideas in school house designing, and for the purpose of showing what I consider the best kind of arrangements for these buildings respectively.

But the fact must not be lost sight of that in these illustrations I have presented but three designs out of the immense number I have made in the past years, and each differing from the others, so that if any board of directors do not like *these*, they can be furnished with such designs as they will like, at short notice.

The arrangement of a school house does not depend upon the architect's ideal house, but he must consider the situation, the points of compass of the building site, the direction of its approaches and from which it will be most prominently seen. All these are important data, and on these must depend, in a great measure, the internal and external design of the house. I have very seldom, if ever, designed two alike.

To illustrate these three designs, commencing with the Prophetstown school house, on page 8, I have given the first and second floor plans, and a perspective view of the exterior.

The second design here given is shown by the floor plans, page 11 and 12, and the perspective, page 13, of the exterior of the high school building now being built at Dodgeville, Iowa Co., Wis. I present these floor plans for the special purpose of calling attention to the arrangement of the wardrobes on each side the teacher's dais, or platform, elsewhere referred to, and also to show an excellent method of arranging a large room on the second floor for the principal and an assistant teacher, there being a fine recitation room, and also a library and apparatus room, with dressing rooms for boys and girls, all attached to the main room. The principal's retiring room and office is also near at hand

The plates representing the last four-room house, two floor plans and a perspective, are from the designs recently made for a

house at Maywood, Illinois, and this is arranged for the dressing rooms on each side of the teacher's dais, like those in the Prophetstown design first noticed.

I am now preparing what I think will be a very fine design for a six-room house, by placing a single room on each story in rear of the Prophetstown or four-room house, with the front substantially as for the four-room house. School Boards wanting to see such a design can send to me for it.

It will be observed that in all of these designs, the entrances at front and rear and side door, if they have any, have their steps mainly under the building. This is economy in construction, because the most of the steps can be built of wood instead of stone; besides it places them under shelter, out of the sleet and ice, and in this way saves a great many broken heads.

The outside doors are recessed well back under shelter, and all swing out and into recesses in the walls or jambs, but not out side the face of the walls.

At the rear there are generally two doors, so as to divide and separate the sexes when they go into their respective back yards, or to the privies, and these yards and privies should be separated by a high board fence or wall.

If I had the cuts prepared, I should be glad to give, in this pamphlet, illustrations of several other school buildings I have lately designed, and which are far in advance of these architecturally, as well as expensively; as for instance a high school building at Marinette, Wisconsin, and another at St. Paul, Minn., the latter to cost from $50,000 to $60,000, and one of the best I have ever designed, though not by any means the most expensive.

Church Architecture.

In the line of Church designing I have hardly done less than in Educational buildings.

The great fire destroyed my record of churches, as well as of school buildings built previous to ten years ago, and I can only recall some of the more prominent of them. Of these the Union Park Congregational Church, of this city, is one of all others that should give me the greatest share of credit, it being the first of the kind known as the "amphitheatre Style" in its full development. Others have been built with a few of the front seats curving around the pulpit in a sort of segment, and still others with the floor inclined in a plane, but it was left for me to cover the entire floor with pews sweeping around the pulpit in a curve of more than a semicircle, with aisles radiating from the pulpit, and last, but not least, a *bowled* floor. Others have claimed, and still claim, to be the originators of this fine conception in church architecture, and there is a man in New York who is heralding this falsehood by circulars sent broadcast all over the country. He claims that the Tabernacle, built in 1870, was the first church built in this style, but unfortunately for his unfounded claim to other people's "thunder," a stone tablet built into the walls of the Union Park Church, says that it was erected in 1869.

The church was deemed so great a success in its conception, that Mr. Bowen, of the N. Y. *Independent*, came here and had drawings made of the exterior and interior, showing the new feature in church designing, had it engraved, and published, and scattered over christendom, wherever the *Independent* was read, 125,000 copies of this improved church architecture. Since then Union Park Church has been the model that all have tried to equal.

The Baptist Church, Grand Rapids, Mich., the Congregational Church at Mansfield, O., and Madison Wis., and the Universalist Church, Minneapolis, Minn., are among the best churches in the country, and all modeled substantially after Union Park Church of this city. The large Westminster Church, now building at Minneapolis, Minn., is from a design by Randall & Miller, made some three years since, while Mr. Miller and myself were associated in business.

Previous to the great fire, as well as since, I have designed an immense number of churches, of all grades and sizes, that will compare favorably with a like number in any part of the country.

I can make designs for small cheap houses on the amphitheatre plan, as well as large ones.

UNION PARK CONGREGATIONAL CHURCH.